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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/923,225	08/06/2001	Stephen J. Plante	A0312/7410 WRM	8975

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EXAMINER	
TORRES, JOSEPH D	
ART UNIT	**PAPER NUMBER**
2112	
MAIL DATE	**DELIVERY MODE**
11/07/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/923,225	PLANTE ET AL.	
	Examiner	Art Unit	
	Joseph D. Torres	2112	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,18,25 and 26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,18,25 and 26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 March 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to claims 1-6, 18, 25 and 26 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amon; Yossi et al. (US 5742621 A, hereafter referred to as Amon) in view of Coombs; Robert Anthony (US 6848074 B2) in further view of CIOFFI, J M et al. (US 5220570 A, hereafter referred to as CIOFFI).

35 U.S.C. 103(a) rejection of claims 1 and 18.

The Examiner begins by pointing out that an add/compare/select unit is device for adding a previously calculated Trellis Path/State metric at time t_0 on a Trellis to a current branch/transition metric from t_0 to t_1 on the Trellis to generate a new Trellis Path/State metric for time t_1 on the Trellis (see col. 1, lines 42-44 in Amon which explicitly teaches each new path/state metric at new/current time t_1 is calculated sequentially by applying the ACS butterfly to the previous path/state metric that was calculated at time t_0 on the Trellis using a current stored branch/transition metric from t_0 to t_1 on the Trellis).

As per claim 1:

Amon teaches that in response to receiving a previously calculated Trellis Path/State metric at time t_0 on a Trellis and a current branch/transition metric from t_0 to t_1 on the Trellis, a digital signal processor (Figure 1 in Amon is a digital signal processor) executing the following steps:

adding a transition metric to a first state metric for time to provide a first value (Step 109 in Figure 3 of Amon is an adder for adding a transition metric to a first state metric for time t_0 to provide a first value);

subtracting the transition metric from a second state metric for time to provide a second value (Step 108 in Figure 3 of Amon is an adder for subtracting the transition metric from a second state metric for time t_0 to provide a second value);

for each selected trellis state, comparing the first and second values (Step 110 in Figure 3 of Amon a comparator for determining the maximum of the corresponding first and

second values for each trellis state); and selecting the maximum of the first and second values for each selected trellis state to provide trellis state metrics for time t_1 (Step 111 in Figure 3 of Amon is a data selector for selecting the maximum of the corresponding first and second values for selected trellis states), wherein the adding, subtracting, comparing and selecting operations are executed by the digital signal processor in response to receiving a previously calculated Trellis Path/State metric at time t_0 on a Trellis and a current branch/transition metric from t_0 to t_1 on the Trellis (see col. 1, lines 42-44 in Amon which explicitly teaches each new path/state metric at new/current time t_1 is calculated sequentially by applying the ACS butterfly to the previous path/state metric that was calculated at time t_0 on the Trellis using a current stored branch/transition metric from t_0 to t_1 on the Trellis; hence add/compare/select I responsive to a previously calculated Trellis Path/State metric at time t_0 on a Trellis and a current branch/transition metric from t_0 to t_1 on the Trellis).

The Examiner asserts that the teachings in Amon teach in totality all of the functional elements pertaining to add/compare/select. Depending on what one considers a single trellis instruction, Amon may even teach that operation of the ACS butterfly circuit is responsive to a single trellis instruction since the single trellis instruction in he claim specifies previously calculated Trellis Path/State metric at time t_0 on a Trellis and a current branch/transition metric from t_0 to t_1 on the Trellis, which is all that is required to operate the ACS butterfly circuit in Amon.

As per claim 18:

Amon teaches a processor (Figure 1 in Amon is a processor) comprising: a memory for storing instructions and operands for digital signal computations (see Program RAM and Instruction Cache 30 in Figure 1 of Amon); a program sequencer for generating instruction addresses for fetching selected ones of said instructions from said memory (DRAM and SRAM Bus Interface and Instruction Cache Control 42 of Amon); and a computation block (data arithmetic unit ALU 54 in Figures 1 and 2) comprising a register file for temporary storage of operands and results (Register File in Figure 2 of Amon) and an accelerator (Figure 3 in Amon is an algorithm for carrying out Add/Compare/Select functions in ALU 54 of Figures 1 and 2; hence is an accelerator) for executing a trellis instruction that specifies locations of trellis state metrics for a time t_0 and transition metrics from time t_0 to time t_1, said accelerator comprising an adder for adding a transition metric to a first state metric for time t_0 to provide a first value (Step 109 in Figure 3 of Amon is an adder for adding a transition metric to a first state metric for time t_0 to provide a first value) and an adder for subtracting the transition metric from a second state metric for time t_0 to provide a second value (Step 108 in Figure 3 of Amon is an adder for subtracting the transition metric from a second state metric for time t_0 to provide a second value), a comparator for determining the maximum of the corresponding first and second values for each trellis state (Step 110 in Figure 3 of Amon a comparator for determining the maximum of the corresponding first and second values for each trellis state) and a data selector for selecting the maximum of the corresponding first and second values for selected trellis states (Step 111 in Figure 3 of

Amon is a data selector for selecting the maximum of the corresponding first and second values for selected trellis states).

Note: Amon teaches that the adding, subtracting, comparing and selecting operations are carried out in Figure 3 in response to a start command comprising trellis states PM1 and PM2 and transition metrics BM (Note: path metrics are state metrics and branch metrics are transition metrics) metrics to initiate the adding, subtracting, comparing and selecting operations. Such a start command is a Trellis instruction since it specifies trellis states PM1 and PM2 and transition metrics BM.

Note also that col. 2, lines 24-31 in Amon explicitly teaches "adding a branch metric to the first path metric to obtain a first result; subtracting the branch metric from the second path metric to obtain a second result; comparing the first result to the second result, and selecting which is greater to become a first survivor metric, and refetching the first previous path metric **during a third single clock cycle**" [Emphasis Added]. That is the adding, subtracting, comparing and selecting operations are all carried out in the third single clock cycle.

However Amon does not explicitly teach the specific use of a single trellis instruction.

Coombs, in an analogous art, teaches use of a single trellis instruction (Claim 13 in Coombs teaches a dingle trellis ACS instruction for operate an ACS circuit).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Amon with the teachings of Coombs by including use of a single trellis instruction. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the

art would have recognized that use of a single trellis instruction would have provided reduced computation time (col. 2, lines 59-67 in Coombs).

However Amon and Coombs do not explicitly teach the specific use of a programmable digital signal processor (Abstract in CIOFFI).

CIOFFI, in an analogous art, teaches use of a programmable digital signal processor.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Amon and Coombs with the teachings of CIOFFI by including use of a programmable digital signal processor. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of a programmable digital signal processor would have provided the abilty to be used in a wide range of operations (col. 1, lines 41-50 in CIOFFI).

1. Claims 2-6, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amon; Yossi et al. (US 5742621 A, hereafter referred to as Amon) in view of Coombs; Robert Anthony (US 6848074 B2) in further view of CIOFFI, J M et al. (US 5220570 A, hereafter referred to as CIOFFI) in further view of Benedetto et al. (S. Benedetto, D. Divsalar, G. Montorsi, and F. Pollara; Soft-Output Decoding Algorithms in Iterative Decoding of Turbo Codes; TDA Progress Report 42-124, February 15, 1996; hereafter referred to as Benedetto).

35 U.S.C. 103(a) rejection of claims 2-6, 25 and 26.

Amon, Coombs and CIOFFI substantially teaches the claimed invention described in claims 1 and 18 (as rejected above).

However Amon does not explicitly teach the specific use of a MAP decoder typically used in turbo decoding (Note: all of the elements in claims 2-6 are elements of MAP decoders for turbo decoders).

Benedetto, in an analogous art, teaches a MAP decoder typically used in turbo decoding. Note: MAP decoders require the use of Add/Compare/Select functions as taught in the appendix of Benedetto. One of ordinary skill in the art at the time the invention was made would have been highly motivated to use the Add/Compare/Select function as taught in Amon since as Amon teaches in the Abstract of Amon, the Add/Compare/Select function as taught in Amon reduces the number of clock cycles required for decoding hence accelerates the decoder.

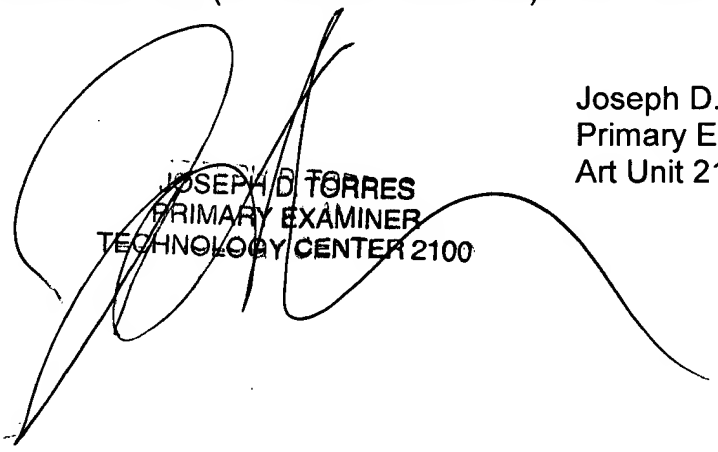
Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Amon, Coombs and CIOFFI with the teachings of Benedetto by including use of the Add/Compare/Select function as taught in Amon with the MAP decoder taught in Benedetto. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of the Add/Compare/Select function as taught in Amon with the MAP decoder taught in Benedetto would have provided the opportunity to reduce the number of clock cycles required for decoding hence accelerating the decoder (see Abstract of Amon).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph D. Torres whose telephone number is (571) 272-3829. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jacques Louis-Jacques can be reached on (571) 272-6962. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Joseph D. Torres, PhD
Primary Examiner
Art Unit 2112